Unit 3

Right Triangles trigonometry

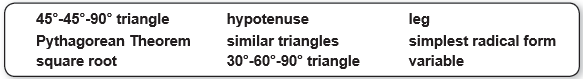
**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

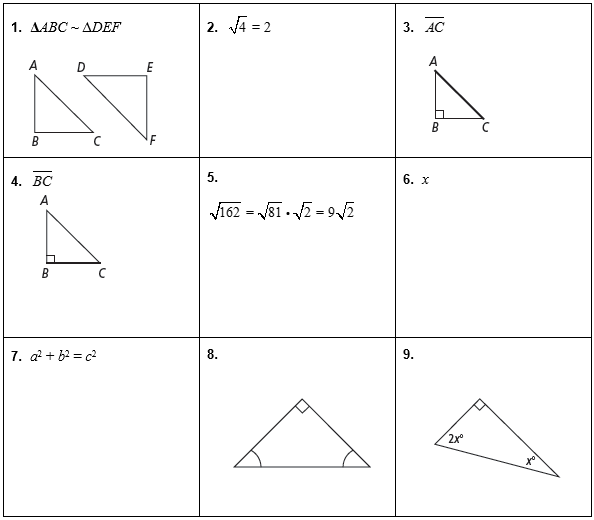
**Period: \_\_\_\_\_**

**2018 – 2019 Geometry**

**Pebblebrook High School – Deuire**

**Vocabulary Builder**

**Choose the concept from the list below that best represents the item in each box.**

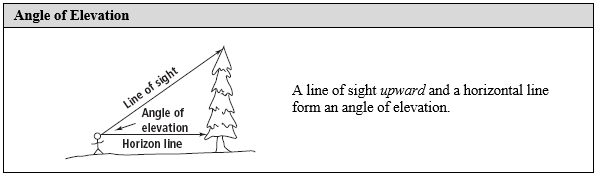


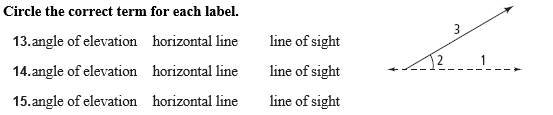
**Draw a line from each word in Column A to its definition in Column B.**

10. Sine

11. Cosine

12. Tangent

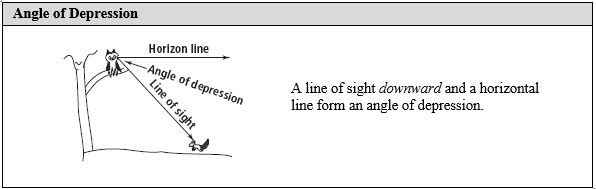


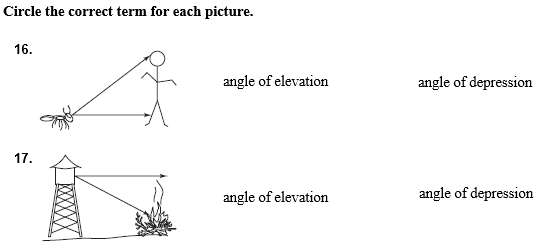


1 =

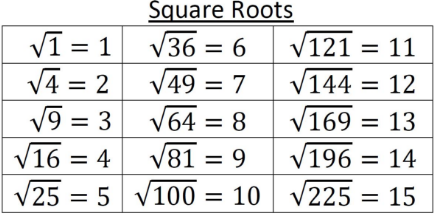
2 =

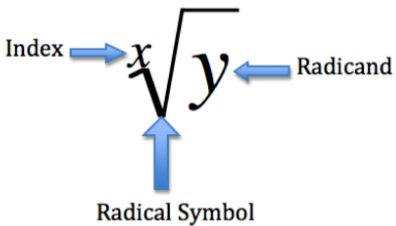
3 =





**3 - 1 Trigonometric Ratios**

If the **\_\_square root\_\_** of a number is a whole number, the original number is called a **\_\_perfect square\_\_**, which is a number multiplied by itself.



A **\_\_radical expression\_\_** is an expression that contains a square root. The number under the radical sign is called the **\_\_radicand\_\_.**

To simplify a radical expression, make sure that the radicand has no **\_\_perfect square\_\_** factors other than 1.

**Example 1**

Simplify each expression.

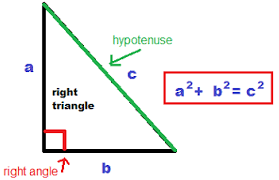


**Example 2**

Simplify each expression.



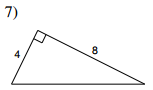


The Pythagorean Theorem is probably the most famous mathematical relationship. The theorem states that in a **\_\_right triangle\_\_**, the sum of the squares of the lengths of the legs **\_\_equals\_\_** the square of the length of the **\_\_hypotenuse\_\_**.

The Pythagorean Theorem gives you a way to find unknown **\_\_side lengths\_\_** when you know a triangle is a right triangle.

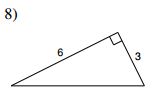
**Example 3**

Find the value of x. Give your answer in simplest radical form.

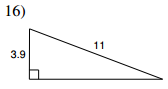


13)

14)



15)



We can use the Pythagorean Theorem to determine if 3 given numbers represent the sides of a right triangle.

**Example 4**

Do these sets of numbers represent the sides of a right triangle?

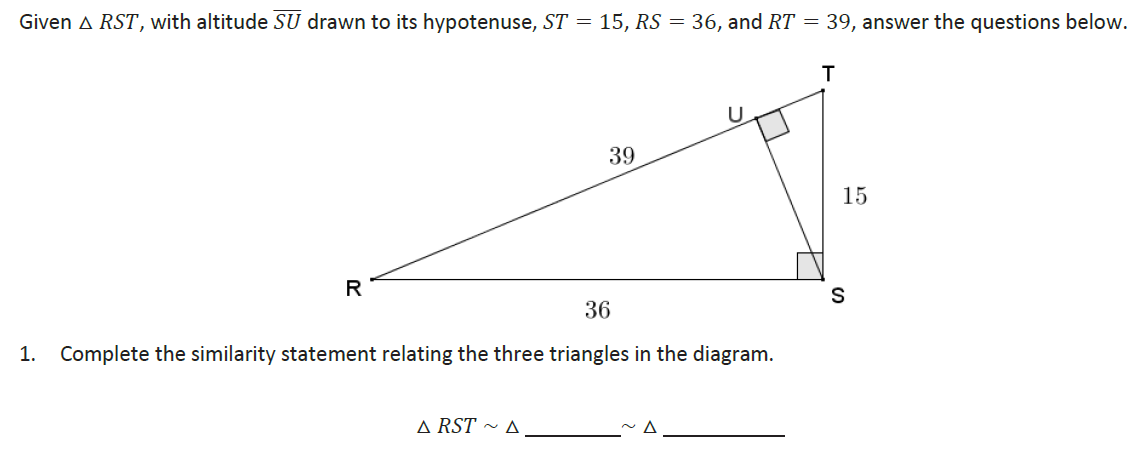
1. 5, 5, 10

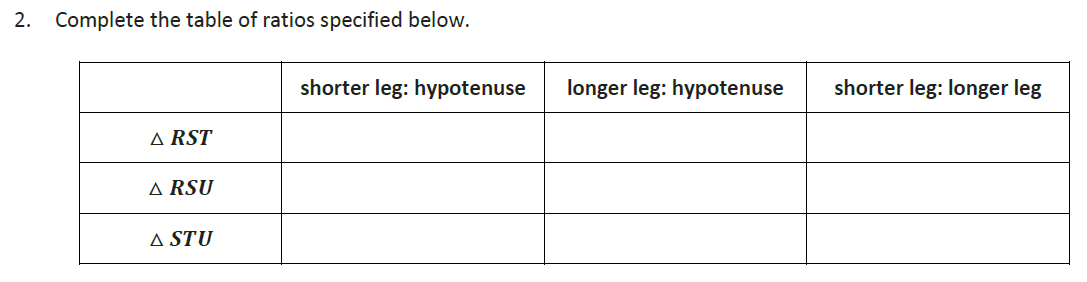
2. 9, 12, 15

4. 4, 6,

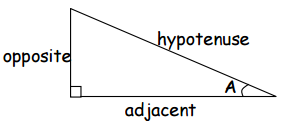
3. 6, 8, 10

Similar Triangles – Dividing into 2 similar sub-triangles

**Example 5**

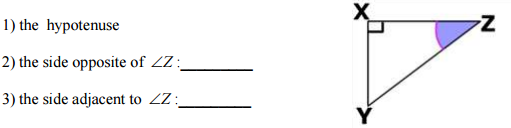


3. Use the values of the ratios you calculated to find the length of and

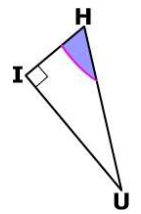
We will further study right triangles by looking at trigonometric values as defined by ratios of the sides of a right triangle. The side labeled **\_\_hypotenuse\_\_** is always opposite the right angle of the right triangle. The other two sides of the right triangle are determined by the angle that is being discussed. The **\_adjacent\_** side will always make up part of the angle that is being discussed and cannot be the hypotenuse. The side of the right triangle that DOES NOT form part of the discussed angle is called the **\_\_opposite\_\_** side.

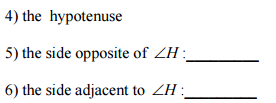
**Example 6**

Identify the opposite, adjacent, and hypotenuse of the following triangles.

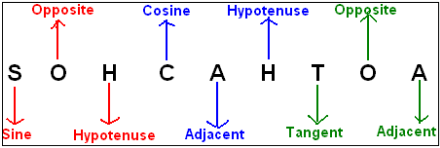


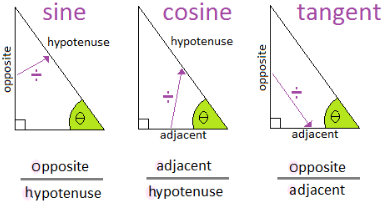
**Example 7**

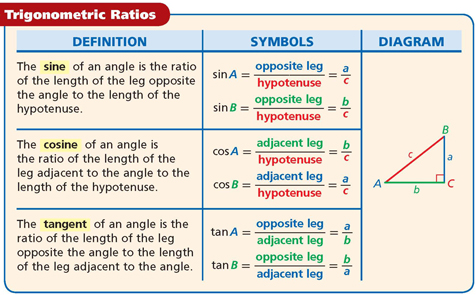
Identify the opposite, adjacent, and hypotenuse of the following triangles.



A **\_\_trigonometric ratio\_\_** is a ratio of two sides of a right triangle.

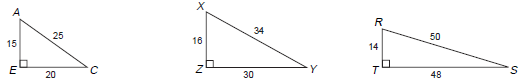
Thinking **\_\_SOH CAH TOA\_\_** can help you remember these ratios.

Using the ratios below, you can find the **\_\_length\_\_** of any side of a **\_\_right\_\_** triangle if you know one **\_\_acute\_\_** angle and any other side.



**Example 8**

Write each trigonometric ratio as a fraction and as a decimal rounded to the nearest hundredth.

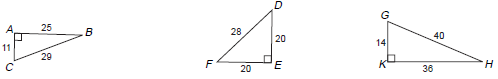








**Example 9**

Write each trigonometric ratio as a fraction and as a decimal rounded to the nearest hundredth.



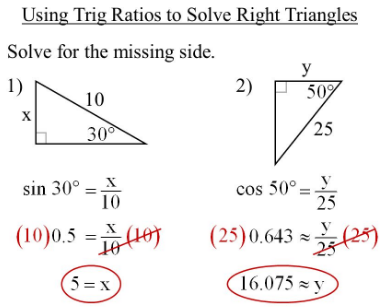


**3 - 2 Finding Missing Sides and Angles of a Right Triangle**

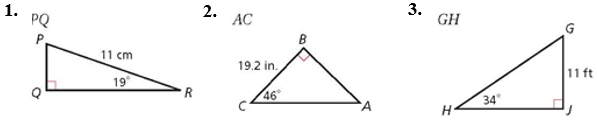
Sine, Cosine, and Tangent are trigonometric **\_functions\_**.

The **\_angle\_** of each function is a(n) **\_input\_** measure.

For each trigonometric function, every acute angle measure produces a different **\_\_output\_\_**, or value of the function.



**Example 1**

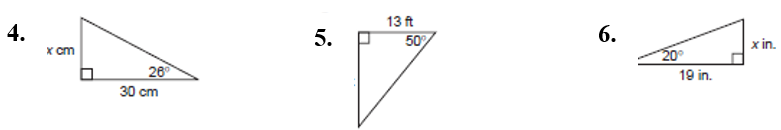
Find each length. Round to the nearest hundredth.

**x**

**x**

**x**

**Example 2**

Find each missing length. Round to the nearest hundredth.

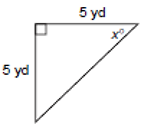
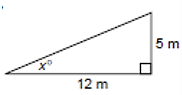
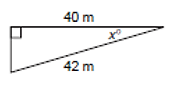
**x**

Using an inverse trigonometric function, such as **\_\_sin-1\_\_**, **\_\_cos-1\_\_**, **\_\_tan-1\_\_** allows you to determine an unknown angle measure given sides of right triangle.

**Example 3**

Find the missing measure. Round to the nearest tenth.

**1.**

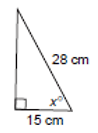
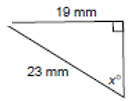
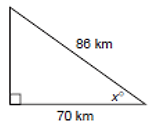


**3.**

**2.**

**Example 4**

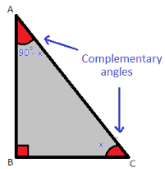
Find the missing measure. Round to the nearest tenth.



**6.**

**5.**

**4.**

**3 – 3 Sine and Cosine of Complementary Angles**

The sum of the measures of the interior angles of a triangle is **\_\_1800\_\_**. Every right triangle has one right angle, so the sum of the measures of the two acute angles in any right triangle must be equal to **\_\_900\_\_**. Angles that add up to 90˚ **\_\_complementary\_\_** angles.

In a right triangle, the **\_\_opposite angles\_\_** for one acute angle is the adjacent leg for the other acute angle. So, the sine of one acute angle is equal to the **\_\_cosine\_\_** of its complement, and vice versa.

**Example 1**

Write each trigonometric function in terms of its complement.

1. ˚

2.

3. ˚

4. ˚

5. ˚

6.

**Example 2**

Write each trigonometric function in terms of its complement.

1. ˚

2.

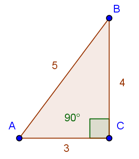
3. ˚

4. ˚

5. ˚

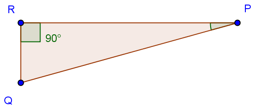
6.

**Example 3**

Find the missing values.

a. b.

b. d.



a. b.

b. d.

m∠P = 30˚

What do you notice about the relationship between sine and cosine?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Example 4**

Write each trigonometric expression.



**Example 5**

Draw ΔABC where ∠ACB = 90˚. AC = 5 and CB = 12.

1. What is the length of AB?
2. What is cos A?

c. What is sin B?

Draw ΔHAT where ∠H = 90˚ and .

1. What is the length of AT?
2. What is sin A?

c. What is cos T?

Draw ΔXYZ where ∠Y = 90˚. XY = 8 and YZ= 6.

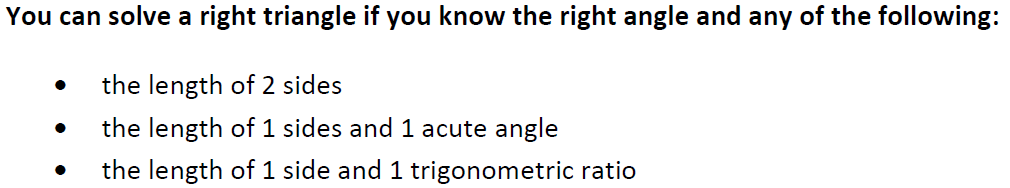
1. What is the length of XZ?
2. What is cos X?

c. What is sin Z?

**3 – 4 Solve Right Triangles**

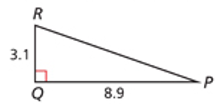
Now that we know how to write the 3 trigonometric functions of a right triangle, we can use these ratios to \_\_solve\_\_ a right triangle.

Solving a right triangle means that we use given **\_\_side lengths\_\_** and **\_\_angle\_\_** measures to calculate missing sides and angle measures.



**Example 1**

Find ALL the unknown measures. Round lengths to the nearest hundredth and angle measures to the nearest degree.



1.

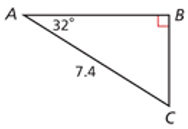
a.

b.

c.

**Example 2**

Find ALL the unknown measures. Round lengths to the nearest hundredth and angle measures to the nearest degree.



2.

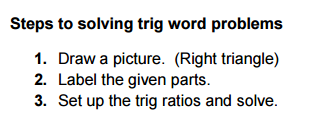
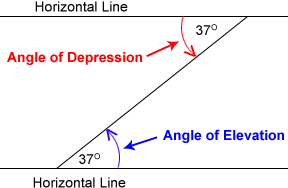
a.

b.

c.

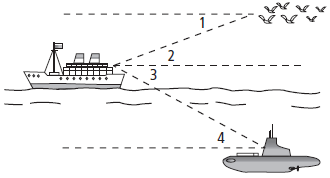
A(n) **\_\_angle of elevation\_\_** is the angle formed by a horizontal line and the line of sight to an object ***ABOVE*** the horizontal line.

A(n) **\_\_angle of depression\_\_** is the angle formed by a horizontal line and the line of sight to an object ***BELOW*** that horizontal line.



**Example 3**

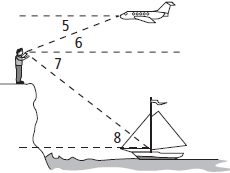
Describe each angle as it relates to the situation in the diagram.





**Example 4**

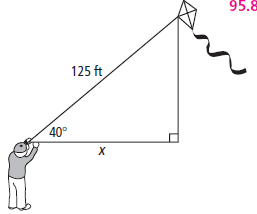
Describe each angle as it relates to the situation in the diagram.



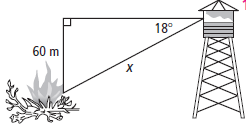


**Example 5**

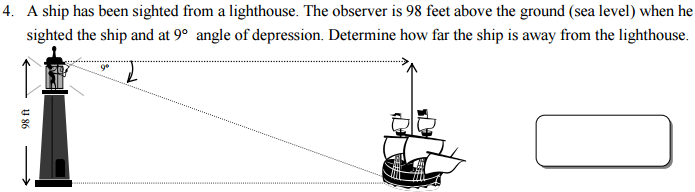
Find the value of x. Round to the nearest tenth.



1.



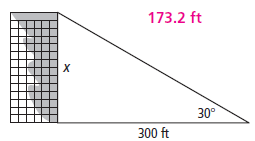
2.



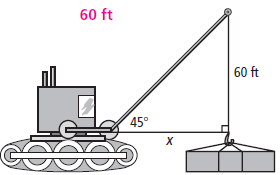
3.

**Example 6**

Find the value of x. Round to the nearest tenth.



1.



2.

3.

